

# Transrectal Prostate Therapy Robot in Closed MRI Scanner

*From Concept to Clinical Trial*

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# Why Prostate?

1,000,000 biopsies /year | 11,000,000 BPH current  
200,000 new cancers /yr | 25% of men affected  
(US data alone)



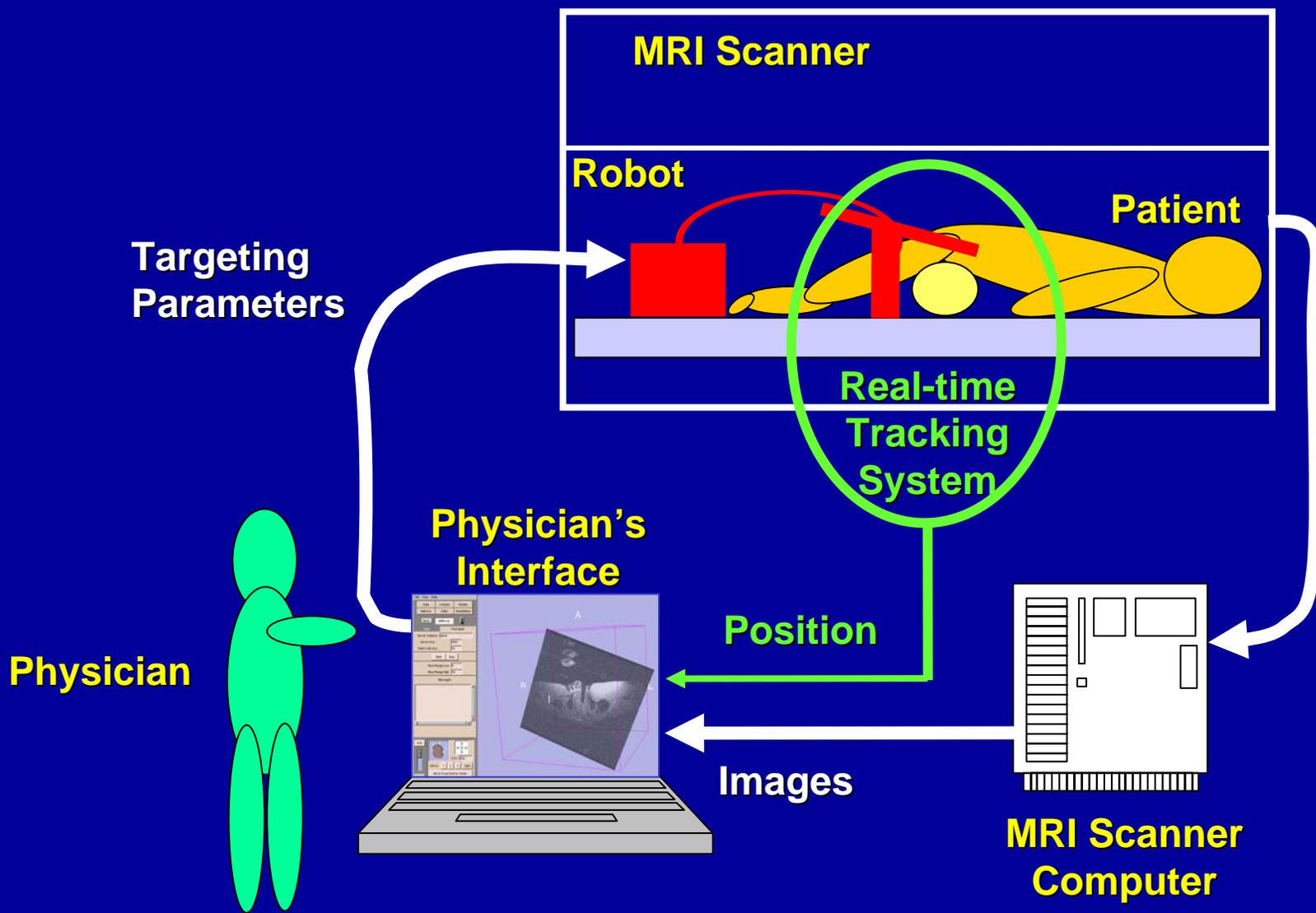
- TRUS imaging misses 20% cancer
- Freehand biopsy may miss <1 cc nodes

## Develop platform for biopsy and therapy

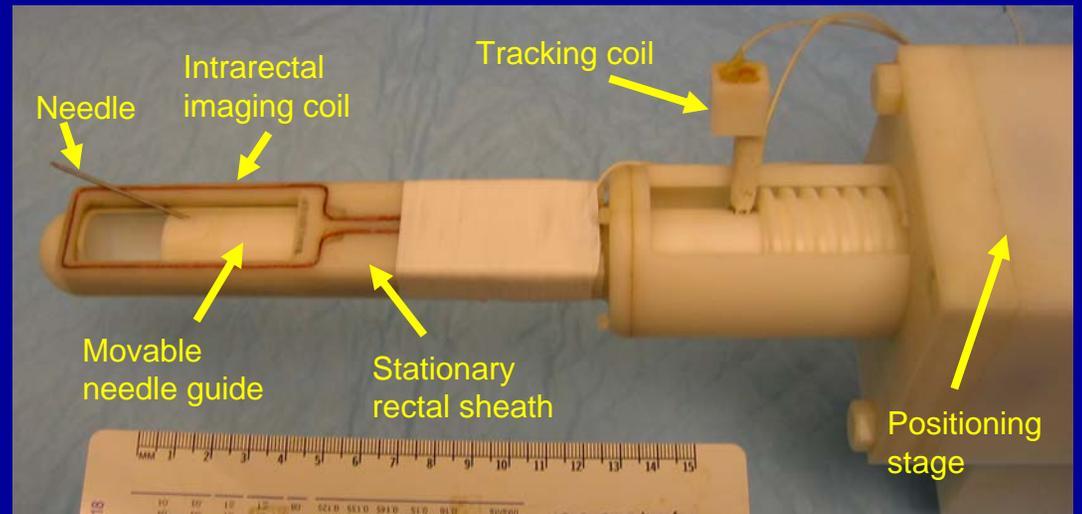
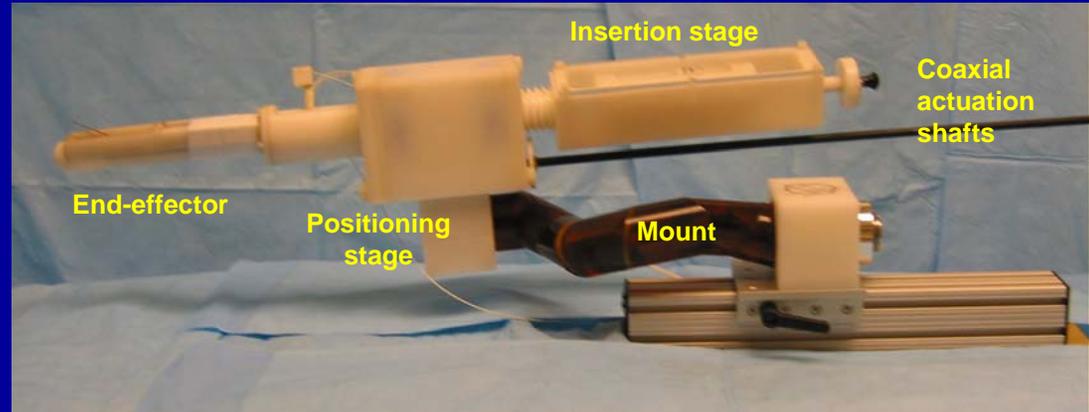
- with millimeter accuracy
- inside a closed MRI scanner
- under real-time monitoring
- across the rectum wall
- with robotic assistance



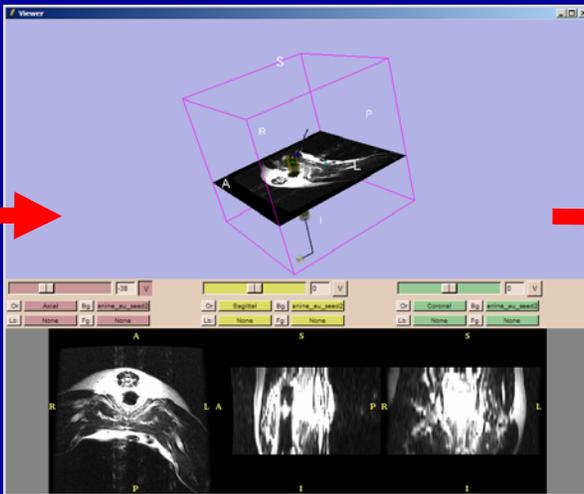
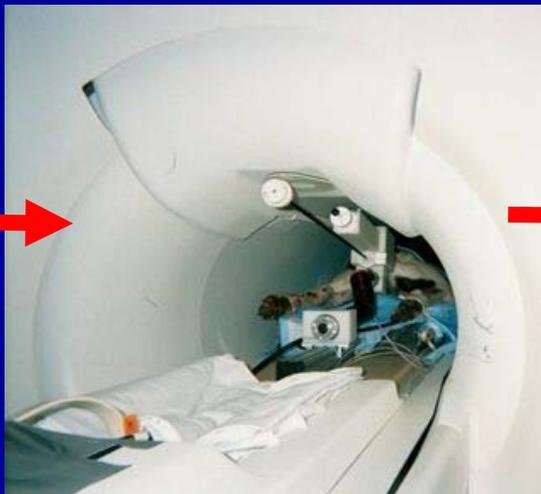
# Point & Click Intervention In Closed MRI



# Canine Prototype

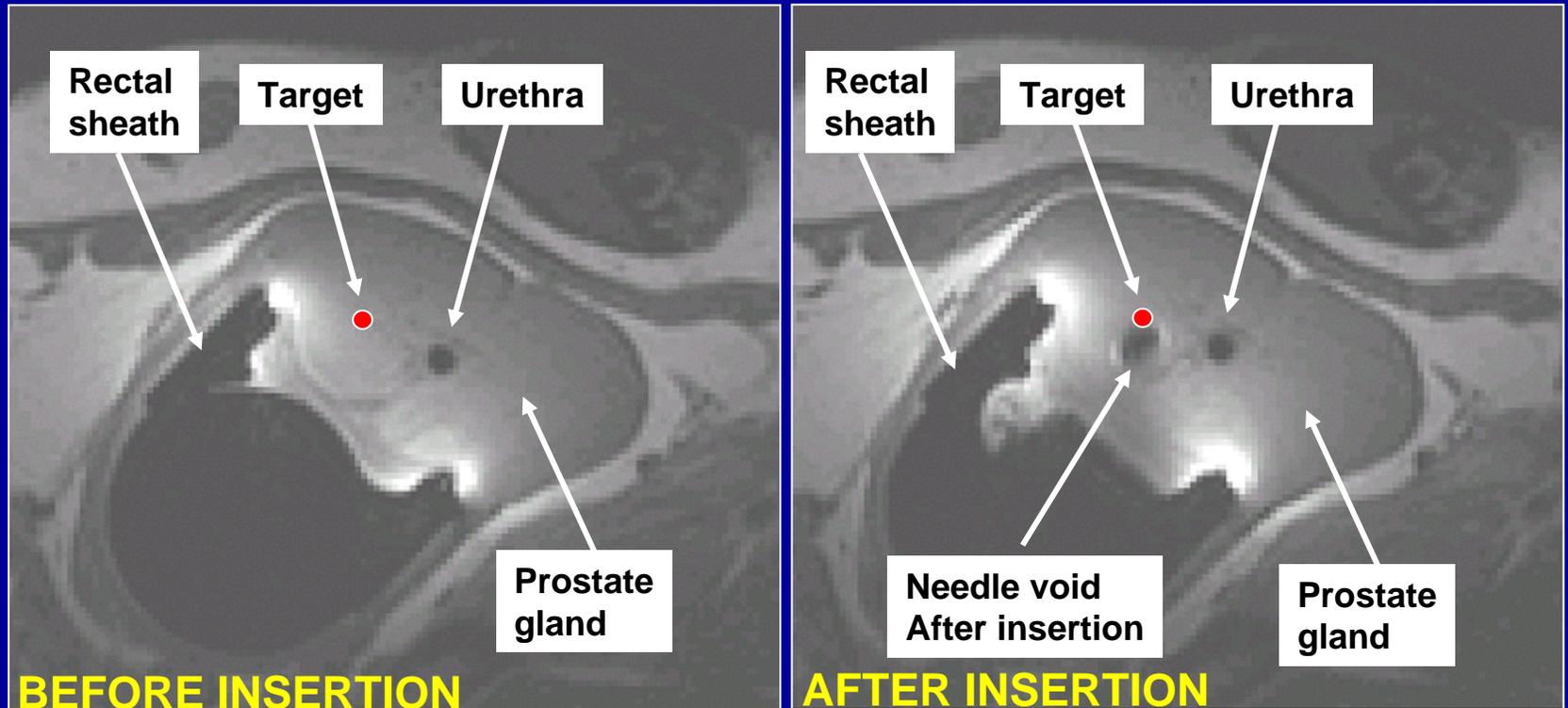


# How it works



# Biopsy Needle Placement in Dog

**Red circle** marks the intended target

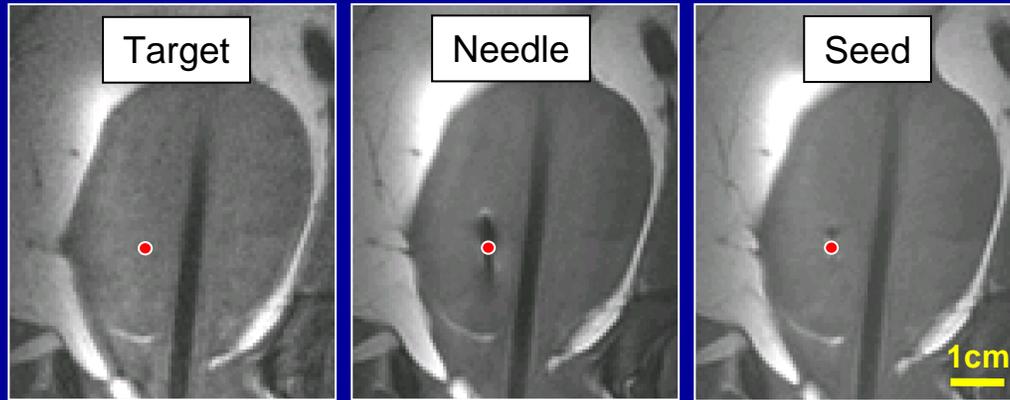


*Placement error was less than 2 mm*

*Very little organ motion was observed*

# Seed Placement in Dog

Seed #1



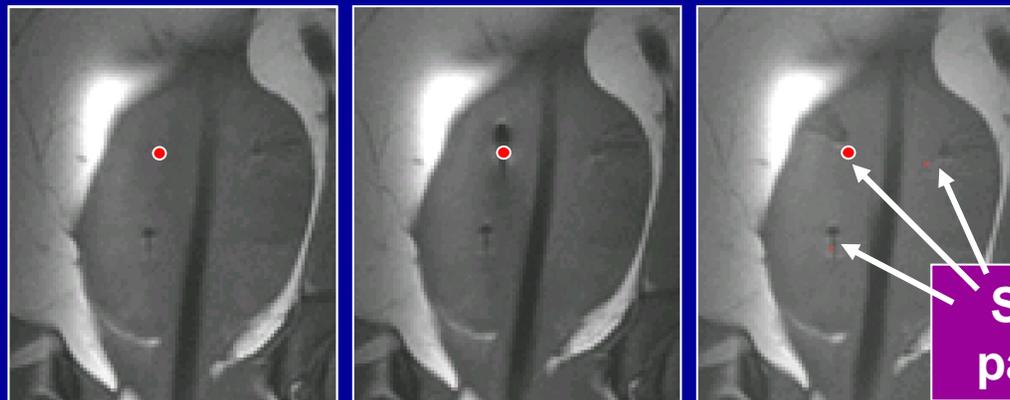
*error ~ 2 mm  
no motion*

Seed #2



*error ~ 2 mm  
no motion*

Seed #3



*error ~ 2 mm  
no motion*

**Simple in-plane  
pattern achieved**

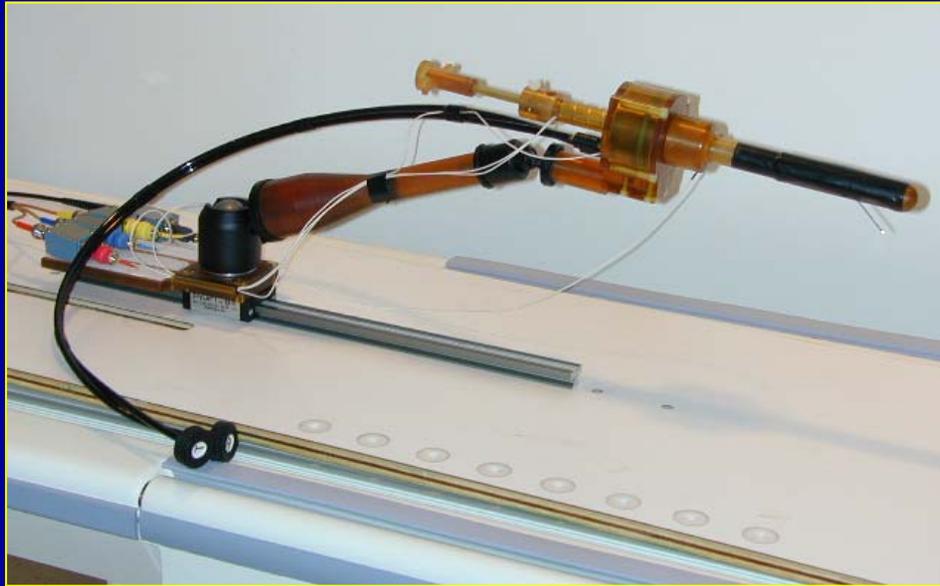


# Summary of Canine Experiments

- Nine dogs, in vivo, under full anesthesia.
  - Sacrificed the dogs afterwards
  - Resected the prostate, visually examined the rectum
  - One premature death due to ventilation failure
  - One excessive bleeding, that stopped later
- 
- ❑ **Prostate and rectum had no excessive damage**
  - ❑ ***Placement error consistently less or around 2 mm***
  - ❑ ***Little or no organ motion***



# The Human-Grade Device



# Clinical Trials in Progress



- Trial 1: Transrectal Prostate Biopsy
  - Trial 2: Transrectal Marker Seed Placement
- Work in progress: combines 12 patients treated, data is being processed*

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